8. (Amended) The exhaust gas purifying apparatus as defined in claim 1, wherein the [intenval] internal combustion engine is a spark ignition type four-cycle engine that operates on the four-stroke cycle consisting of a suction stroke, compression stroke, combustion/expansion stroke, and exhaust stroke.

12. (Amended) The exhaust gas purifying apparatus as defined in claim 10, wherein [the single catalyst of] the light-off catalyst includes a single catalyst that functions as a three way catalyst.

14. (Amended) The exhaust gas purifying apparatus as defined in claim 13, wherein the light [of] off catalyst functions also as an SOx catalyst.

REMARKS

Claims 1-14 are pending.

Claim 1 is an independent claim.

OBJECTION TO THE SPECIFICATION

In Sections 2 and 3 of the Office Action, objections were made to the Specification. Changes have been made along the lines suggested in the Office Action.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the objection to the Specification.

OBJECTION TO THE CLAIMS

Claims 8 and 14 were objected to for the reasons set forth in Section 4 of the Office Action.

Claims 8 and 14 have been amended to make the changes as suggested in the Office Action. These changes do not narrow the scope of the claims.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the objection to claims 8 and 14.

REPLY TO REJECTIONS

First Rejection

Claims 12-14 were rejected under 35 U.S.C. § 112 for the reasons set forth in Section 6 of the Office Action.

Claim 12 has been editorially corrected and does now comply with 35 U.S.C. § 112, second paragraph. These changes do not narrow the scope of the claims.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. § 112.

Second Rejection

Claims 1-5, 8, and 10-14 were rejected as being unpatentable Sanbayashi et al. (U.S. Patent No. 5,349,816) in view of Hu et al. (U.S. Patent No. 6,044,644). This rejection is traversed.

Directing attention to base claim 1, no *prima facie* case of obviousness has been established.

Initially, in claim 1 there is the limitation as follows:

> A light-off catalyst provided upstream of the exhaust gas purifying means in the exhaust passage, said light-off catalyst having a lower O_2 storage ability than said exhaust gas purifying means; (underline added)

This is not shown or suggested in the references applied.

Also, in the combination, the Office Action asserts that in Sanbayashi et al. the control means which is set forth in the last paragraph of claim 1 and its function is shown in the base reference to Sanbayashi et al.

In Sanbayashi et al., element 3 is a temperature sensor and an input into element 3 is an engine speed sensor 27. In totality, the element ECU (element 3) does not perform the function that has been set forth in the claim which is as follows:

> Control means for controlling the air/fuel ratio of the exhaust gas so that an atmosphere having a reduced oxygen concentration is produced around said exhaust gas purifying when an NO_x conversion efficiency of the exhaust gas purifying means is decreased.

Yes it does it is inherent See Fig. 4, 10

Additionally, in the present claimed device, the control means includes means within the ECU (element 20) that perform the function. See, for example, Figure 5 and a description in the Specification.

In particular, element 20 is identified as having an additional fuel injection control means. As set forth in the Specification, at page 31, the

additional fuel injection control means 27 controls the injector 8 to inject an additional fuel to regenerate the lean NO_x catalyst 13. See, for example, page 31, lines 22-25. The result of this is set forth, for example, on page 32, lines 26-30 which states as follows:

> In the recovery control, an atmosphere having a reduced oxygen concentration is produced around the lean NO_x catalyst 13, and NO_x that has been absorbed on the lean NO_x catalyst 13 is released, to resume the NO_x conversion efficiency to the desired level.

See Fig. 4, 10
Col. 5

In evaluating the control means, the means set forth in the Specification must be considered. See In re Donaldson, 29 USPQ2d 1845 (Fed. Cir. 1994) (as explained in MPEP § 2181 and § 2182). It appears that the Patent Office in the Office Action has not given the full weight to the meaning of the control means and its function as set forth in the claims. It is submitted that the ECU of the reference to Sanbayashi et al. does not show or suggest the functions let alone the structure of the control means as it must be interpreted under the Doctrine set forth in In re Donaldson.

The addition of the secondary reference to Hu et al. (U.S. Patent No. 6,044,644) does not cure the deficiencies of the rejection innate in Sanbayashi et al.

The addition of the secondary reference does not cure the deficiencies of Sanbayashi as explained above.

In summary the purpose of the present invention is to positively release NO_x and SO_x from a NO_x catalyst without decreasing the fuel efficiency. In

Sanbayashi et al. the purpose is to protect an NO_x catalyst function from the warm-up catalyst (the first catalyst) which requires hydrocarbon.

In the present invention the light-off catalyst has a lower O_2 storage ability than an exhaust gas purifying means (see for example claim 1). In contrast in Sanbayashi et al. the first catalyst 9 is much smaller than the second catalyst 10. With this disclosure it is not shown or suggested anything about the 0_2 storage. Generally, 0_2 storage ability depends on the component of the catalyst. Therefore, this patent shows only the volume of the first catalyst. In summary, this patent does not disclose anything about the 0_2 storage capability.

Secondly, the light-off catalyst 11 and the lean NO_x catalyst 13 are disposed in an exhaust passage 3N series. This result and all the exhaust gas from the engine passes both catalyst regardless of the engines operation modes. See claim 2 for example. In Sanbayashi et al. the first catalyst is located in an upstream main passage 201. This upstream main pass has a bypass 202. With this structure only exhaust gas when the engine operates on a stoichiometric or rich air/fuel ratio passes through the first catalyst.

Thirdly, in the present claimed invention (see for example claim 1), the lean catalyst has at least a function of NO_x absorbing and releasing. In Sanbayashi et al. the lean NO_x catalyst 22 reduces NO_x in the exhaust gas containing excess oxygen when the ratio of HC/CO is above a predetermined level.

it adsorbs NO_x into its catalytic element (platinum) and when lean and desorbs NO_x when rich and reduces

Fourthly, the ECU in the present invention controls the air/fuel ratio of the exhaust gas so that an atmosphere having a reduced oxygen concentration for resuming the NO_x conversion efficiency. See for example claim 1. In comparison in Sanbayashi et al. the ECU does not have the ECU function as claimed. The ECU in Sanbayashi et al. only selects a select valve position in accordance to engine operation. In summary, when the engine operates on a lean air/fuel ratio the upstream main path 201 is closed to prevent the first catalyst 9 from consuming HC.

See Fig. 4, 10

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. § 103.

Third Rejection

Claims 3, 4, 6, and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sanbayashi et al. and Hu et al. as applied to claim 1 above and further in view of Design Choice. This rejection is traversed.

Note claim 4 now depends on claim 3 not claim 1. This change relates to editorial accuracy.

Initially, the assertion of Design Choice does not cure the deficiencies innate in the rejection based on the Sanbayashi et al. and Hu et al. references.

Secondly, it was asserted that there is nothing of record which establishes that the claimed maximum volume metric or weight amount of

oxygen absorbed in a light-off catalyst presents a novel of [sic or] unexpected result.

The result of this particular limitation is that the device can more efficiently function to perform its purpose. There is nothing in the art to suggest this structure.

Although the result may not be set forth in the Specification, the result as argued is evidence. See In re Chu, 36 USPQ2d 1089, 1095 (Fed. Cir. 1995) wherein Judge Rich, writing for the Court, stated as follows:

> We have found no cases supporting the position that a patent applicant's evidence and/or arguments traversing a § 103 rejection must be contained within the specification. There is no logical support for such a proposition as well, given that obviousness is determined by the totality of the record including, in some instances most significantly, the evidence and arguments proffered during the give-and-take of ex parte patent prosecution.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. § 103.

Fourth Rejection

Claim 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sanbayashi et al. and Hu et al. as applied to claim 8 above and further in view of Official Notice. This rejection is traversed.

Initially, claim 9 is considered patentable for the same reasons as claim 8. The taking of Official Notice does not cure the innate deficiencies of the rejection based on Sanbayashi et al. and Hu et al.

Additionally, while a direct injection engine may be known, the rejection is incomplete in establishing a *prima facie* case of obviousness because the rejection lacks a motivation to make the combination. This is a basic requirement of a rejection under 35 U.S.C. § 103.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claim under 35 U.S.C. § 103.

PRIOR ART

While additional prior art has been cited in Section 12 of the Office Action, no comments are considered necessary because this art has not been applied in any rejection.

CONCLUSION

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Mr. Elliot Goldberg at (703) 205-8000 in the Washington, D.C. area.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants respectfully petition for a one (1) month extension of time for filing a reply in connection with the present application and the required fee of $110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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